

**Elemental Analysis of Contaminated Sediments From Harbor of NY/NJ and Hamburg  
Using Synchrotron Radiation-Induced X-Ray Emission (SRIXE)\***

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Contaminated estuarine sediments from the New York/New Jersey (NY/NJ) Harbor and Hamburg Harbor of Germany have been analyzed using SRIXE in order to determine metal concentrations and spatial distributions as a function of particle size. Such data is needed for contaminant transport modeling and for development of decontamination technologies. The experiment was performed at the SRIXE microprobe at the Brookhaven National Synchrotron Light Source and measured the spatial distributions of elements with  $Z > 20$  in individual particles with a resolution of 10  $\mu\text{m}$ .

The main components of the dredged materials from the NY/NJ Harbor are quartz, illite and chlorite with minor amounts of plagioclase and amphibole while, for Hamburg Harbor, they are clay mineral, quartz, calcite, feldspar, and hematite. The sediments were separated into size fractions ranging from over 2 mm to less than 56  $\mu\text{m}$ . Most particles analyzed were spheroidal in shape suggesting that most of them could be quartz. At least 20 individual grains in each size fraction were analyzed so that an estimate of the concentration variation from particle to particle could be found. The results show that: 1) Concentrations of Fe, Cu, and Zn were greater than the concentrations of other elements; 2) the concentrations roughly increase with the particle sizes; 3) the concentrations of metals in individual grains of the different size fractions are very nonuniform; 4) all metals show roughly positive correlation. The results for Hamburg are similar to those found for the NY/NJ Harbor sediments, although the elemental concentrations are lower. The spatial distributions suggest that the common assumption that metals are found largely on a surface layer rather than being distributed through the entire volume of the particle needs further investigation.

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